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1. Your reference

N.75597 SLS

2. Patent application number
(The Patent Office will fill in this part)

11 NOV 1998 **9824783.6**

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

ISIS INNOVATION LIMITED
2 South Parks Road
Oxford
OX1 3UB

Patents ADP number *(if you know it)*

3998564001

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

4. Title of the invention

METHOD AND DEVICE FOR RETRIEVING VIDEO DATA FROM A REMOTE SOURCE AND VIDEO DATA SOURCE FOR REMOTE RETRIEVAL

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

J A KEMP & CO
14 SOUTH SQUARE
GRAY'S INN
LONDON WC1R 5LX

Patents ADP number *(if you know it)*

26001

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

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Number of earlier application	Date of filing *(day / month / year)*

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Claim(s)	3
Abstract	1
Drawing(s)	4

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Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	1
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application

Signature

Date 11 November 1998

J.A. KEMP & CO.

12. Name and daytime telephone number of person to contact in the United Kingdom

0171 405 3292

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METHOD AND DEVICE FOR RETRIEVING VIDEO DATA FROM A REMOTE SOURCE AND VIDEO DATA SOURCE FOR REMOTE RETRIEVAL

The present invention relates to a method and device for retrieving video data from a remote source and a video data source for remote retrieval.

It is known to provide video data for access by remote users. The video data may comprise relatively short video clips or entire video films, for instance in the case of "video-on-demand".

Previous systems have a number of drawbacks. In particular, video data files are typically very large and, hence, take a considerable amount of time to download over the Internet. Furthermore, video data files are often provided on Internet servers in a format which is more advanced than or inappropriate for many user terminals. They may also be of a size too great for the memories of many user terminals.

According to the present invention, there is provided a method of retrieving video data from a remote source, the method comprising:

retrieving from the source a preview image of the video data;

specifying parameters relating to the video data and sending the parameters to the source; and

receiving video data transmitted by the source on the basis of the parameters.

In conjunction with this method, there may also be provided a video data source for remote access, the source being responsive to a remote user to transmit a preview image of a video data file and being responsive to parameters received from the remote user to transmit video data from the video data file on the basis of the received parameters.

In this way, a user may quickly and easily download

a preview of the video data and then specify the nature of the video data required. In some cases, a user may require only part of the full video sequence, for instance only the first half, or may require only part of the image, for instance only the bottom right portion. By specifying such parameters to the source, unnecessary data is not transmitted over the Internet, such that the downloading time is reduced. Furthermore, the user terminal may have a relatively unsophiscated processor or a small memory. By specifying appropriate parameters, the source will transmit the video data with an appropriate resolution, encoding, compression, etc.

Preferably, the parameters specify one or more of a required image customisation, the temporal extent of the video data required, the spatial extent of the video data required, an extent to which the video data should be zoomed, the playback speed of the video data, the nature of the encoding of the video data, the digital video format, the compression/decompression algorithm, the degree of compression or compression quality and any image processing, such as contrast enhancement, smoothing/sharpening, pseudocolour, etc.

Hence, the source preferably processes the video data according to the parameters to provide one or more of a customized image, a temporal extract from the video data, a spacial extract from the video data, zooming of the video data, variations in playback speed of the video data, encoding customisation of the video data, selection of the digital video format, selection of compression/decompression algorithms (codecs), selection of the degree of compression or compression quality and selection of any image processing.

In this way, rather than download an entire video sequence and then edit and process it, a user merely requests from the source the content of the video data

required. This enables shorter downloading times and makes use of processing by the source, such that a relatively unsophiscated remote user terminal can obtain any video sequence as required.

According to the present invention, there is also provided a device for retrieving video data from a remote source, the device including:

means for requesting a preview image of the video data from the remote source;

means for transmitting parameters relating to the video data and requesting video data on the basis of the parameters; and

means for retrieving video data supplied from the source on the basis of the parameters.

Once a user terminal has accessed the source, the source can transmit to the user a control program to enable the user to specify the parameters. The control program may take the form of a Java applet.

In this way, the user terminal does not in itself require any features dedicated to the remote source, but acquires the ability to control the source upon accessing it.

The invention will be more clearly understood from the following description, given by way of example only, with reference to the accompanying drawings, in which:

Figure 1 illustrates schematically an embodiment of the present invention on a network;

Figure 2 illustrates schematically an alternative embodiment of the invention on a network;

Figure 3 illustrates the control panel of a user terminal operating according to an embodiment of the present invention; and

Figure 4 illustrates another control panel of a user terminal operating according to an embodiment of the present invention.

As is well known and as is illustrated in Figure 1, a number of user terminals 2,4,6 may communicate with a server 8 over a network 10. In particular, it is possible to provide the user terminals 2,4,6 and the server 8 with connections to the Internet 10, such that they may communicate over the Internet 10.

The server 8 may provide many different services to the user terminals 2,4,6. One very common use of a server 8 is to provide a database of information. The database may include many different types of data, including text, sounds and images. The present application is particularly concerned with the provision of a database of video images. The server 8 may store the database of video images itself or may handle video images stored at a remote location. The video images may be transferred to the server 8 from the remote location by a dedicated line or, as illustrated in Figure 2, a separate database 12 may be provided on the network or Internet 10.

It is now proposed to provide a system based in the server 8 and/or the user terminals 2,4,6 which enables video data to be downloaded from the server 8 more efficiently. In particular, the system is intended to allow only desired portions of particular video files to be downloaded and then to be downloaded in a format required.

The preferred embodiment to be described below is to be called VIDOS, since it relates to a new Video Download Specification. It is intended that VIDOS be implemented through a Java driven graphical user interface. Java is a particular form of programming suitable for interactive work over the Internet. In particular, the server 8 includes a Java applet relating to the video database. When a user terminal 2,4,6 accesses the server 8, the Java applet is sent to the particular user terminal 2,4,6

and this enables the user terminal 2,4,6 to send appropriate parameters to the server 8 to control the required downloading of video data. In other words, it permits the end-user to enter the parameters required to customize a personal version of a particular digital video, to be informed of the consequences of these parameter choices in terms of for instance image quality, compression time and final video file size and to see a preview of the customized version prior to final downloading.

Upon first accessing the server 8, the user terminal 2,4,6 presents to the user a control panel, such as illustrated in Figure 3. This illustrates a preview image of the video data of interest. The preview image may take the form of a still image representative of the chosen digital video file or indeed it could comprise a low resolution video image and/or a streamed video image. It may also present data relating to the size and format of the full data file as stored by the server 8 or the other system 12. The user could then choose to download the entire video file in a known manner and in its original format or could choose to make use of the VIDOS system.

Having chosen the VIDOS system, the user terminal presents a control panel, such as illustrated in Figure 4.

Once again, the preview image representative of the chosen video file is displayed in the upper portion of the control panel. The user is then able to enter required parameters for the downloading of video data.

In entering the download customization parameters, the end-user can first determine the spatial extent of the movie to be downloaded. By default, this is full frame, but the end-user can interactively limit the spatial region of each frame to a particular rectangular

Area Of Interest (AoI). The dimensions of this may be defined in a number of ways: by using mouse clicks to identify the upper left and lower right corners of the box; by typing the cropping values in the four text boxes (left, right, top and bottom) immediately below the video image; or by increasing or decreasing the values in these boxes using the adjacent + and - spinner buttons. In whichever way the end-user chooses to specify the AoI, the selected area is preferably displayed by an outline on the illustrated video image (Fig. 4). A zoom parameter may also be specified. In the illustrated control panel, this is the right-hand box on the top row. Taking account of this zoom factor, the cropped original frame size and the resulting download frame size are interactively displayed in the adjacent area. In addition, the file size of the output video in Kbytes after such spatial editing and an estimate of the conversion time required to generate the customized video may be indicated (as illustrated near the foot of the screen). These values may also be interactively updated as the AoI cropping parameters and the other download customization parameters described below are modified.

As illustrated in Figure 4, beneath the boxes specifying the spatial constraints to be imposed on the original video prior to downloading, it is also possible to provide similar controls by which the end-user can undertake temporal editing of the original video. By using these to enter the first and last frame numbers, the end-user is able to specify the timepoints in the original video that will become the beginning and end of the customized video. The default values preferably include the whole of the original video.

Once the spatial and temporal parameters have been chosen, the end-user may then use other controls to specify other customizing parameters. As illustrated,

drop-down list boxes are provided in the third row to specify the final customizing parameters that relate to the video format and compression. The first of these specifies the digital video format to be used, with a choice between AVI (Audio Video Interleave), QT (Quick Time) and MPEG-1. The second is for the video frame rate, for example either 10, 15, 20, 25 or 30 frames per second. Then comes the choice of the compression codec to be applied to the video. The choice may be made from the possibilities shown below in Table 1, with these choices preferably being automatically adapted to the initial choice of video format, as appropriate. Finally, the end-user can specify the compression quality setting, with a choice between 'High', 'Medium' or 'Low' (for example corresponding to bitrates of 579,000, 1,158,000 and 2,316,000 bits per second for MPEG-1, or to values of 0.3, 0.6 and 0.9 for spatial quality setting for the other codecs), or 'Uncompressed' (not available if MPEG-1 has been chosen for the video format).

Table I: Commonly available video formats and codecs

Video format	Codec	Compression quality setting
QT and AVI	None	
	Cinepak	Spatial quality (0.0-1.0) or bit rate (bits/second), and key frame frequency
	Indeo	Spatial quality (0.0-1.0) and key frame frequency
	M-JPEG	Spatial quality (0.0-1.0)
QT only	Animation RLE	Spatial quality (0.0-1.0)
	Video RPZA	Spatial quality (0.0-1.0) and key frame frequency
MPEG-1	MPEG	Bit rate and key frame frequency
MPEG-2	MPEG	Bit rate and key frame frequency

As previously mentioned, all of these parameters preferably have initial default values. If incompatible choices are made, the system preferably informs the user and offer appropriate alternatives. Every time a parameter choice is made, the estimates of the final image file size and conversion time displayed at the bottom of the VIDOS interface screen can be automatically updated. These estimates are determined from a data table derived for particular hardware under the full range of possible compression conditions and estimates of the conversion time would obviously vary depending on the performance of the server on which the system was running.

In the light of the feedback provided by VIDOS, the input parameters may be revised. The system preferably provides a "Preview" control for use once the end user believes that download specification parameters have been optimized for the required purpose. As illustrated, a 'Preview' button is provided at the foot of the VIDOS interface screen. This preferably activates the customization of the first section, for example the first fifty frames, of the video and displays it in a new window. In this way, the end-user is given the opportunity to make a final quality assurance check, to ensure that the customized video will have the required appearance and characteristics. At this stage, the download specification parameters can be further revised, if desired, until the preview is acceptable.

Finally, the system allows control to activate the server to convert or process the video data as required and download it to the user terminal. As illustrated, a 'Convert' button is provided at the foot of the VIDOS interface screen. This may be clicked to activate the VIDOS server program to generate a full customized downloadable file with the precise specifications

requested, containing just the required portions of the original movie. The end user may already know the time that this conversion is likely to take, having been advised of this at the foot of the VIDOS interface screen. Depending upon the length of the original video, the nature of the customization requested and the computing power of the server, the conversion process may be several minutes. When this task is complete, VIDOS may then open a new window which contains a message confirming the compressed size of the customized version of the video and providing a link to the video file itself. Clicking on this link button may initiate the final downloading process.

Of course, the system can also provide one or more of a wide variety of options in choosing parameters for the customized downloading of video data. Other options include the following:

(a) the addition of video play controls to the VIDOS interface, to permit the Area of Interest to be specified while watching the original video being played, for instance as a low resolution streamed movie, to ensure that the AoI includes all the objects and events of interest;

(b) the ability to view the frames chosen for the start and end times, by positioning sliders on the video time-line control;

(c) the ability to select multiple clips from the original video to comprise the customized version, rather than only to 'top and tail' it;

(d) the capability of specifying a time lapse ratio between the original and the customized version of the video, such that the end-user can view important events either in slow motion or speeded up;

(e) image processing such as contrast enhancement, smoothing/sharpening, pseudocolour, etc;

(f) the ability to select a required soundtrack, for instance a language for a film, or to eliminate the soundtrack;

(g) the ability to undertake such customization on a digital video stored on a third-party computer, distinct from the VIDOS client and host machines, so that the VIDOS host becomes a proxy server for the video conversion.

In conclusion, once a particular video has been identified on a distant Internet server and selected for further study, the end-user can select the format and compression quality settings and to undertake simple spatio-temporal editing before downloading. In this way, the video quality and playback characteristics can be matched to the intended use to which the video will be put. This may achieve substantial savings in download time and disc storage requirements. If, for example, the viewer wishes to see the entire video immediately, but has only a low-speed modem and limited disc space, a highly compressed and spatially reduced ('dezoomed') version might be chosen to enable uninterrupted Internet transmission at full frame rate. Alternatively, if the video is to be downloaded for subsequent local projection, for example during a lecture, the lecturer will wish to ensure that it is downloaded at full frame size, with the highest possible quality compatible with the real-time video display bandwidth of the local video server. If the purpose is instead to undertake frame-by-frame image analysis, in order to quantify particular features in the images, then it is desirable to download the video at the highest possible resolution, even if this means prolonged conversion and downloading processes that may be conveniently performed overnight.

The present invention permits the end-user to customize a personal version of a particular digital

video available on the Web prior to downloading, hence permitting the video to be customized to suit the video playback software available on the user's computer, the bandwidth of its Internet connection, the available disc storage space or the subsequent usage to which the video will be put.

Specifically, it is possible to provide the ability to select from the complete movie a specific spatial area and a time period of interest, to choose the frame rate and the zoom factor, and to specify the download format and the nature and quality of the digital compression to be applied. In this way, the video quality and playback characteristics can be matched to the intended use to which the video will be put, and substantial savings in download time and disc storage requirement may be obtained.

The preferred embodiment described as VIDOS can be written as a platform-independent Java applet running in a Web browser by which the end-user can specify the parameters to be used in preparing the customized version. On-line help may be available to guide the naive user in making these choices. All the parameters have initial default values, and, in case of incompatibilities in the choices made, the program may inform the user and offer appropriate alternatives.

As described above, the download customization parameters may be passed via standard Web protocols to the main VIDOS system on the distant server. The server may operate using a Java program and standard programming tools and libraries to produce the desired customized version of the video. It can then open a new client web page containing a link to the customized video file, which if clicked will initiate the downloading process.

The present invention has wide ranging applications for transferring video data.

Scientific video databases exist, for instance with video clips of various biological processes. Using the present invention, a user can download only that part of a video clip which is of interest, either in temporal or spacial terms. Similarly, the user can download the video data with the quality or format required. The present invention has other applications, for instance allowing viewers to access only part of a feature film available with video-on-demand and in a required format. Also regional members of a TV network could use the system to download particular portions of news items useful for their particular region.

CLAIMS

1. A method of retrieving video data from a remote source, the method comprising:

retrieving from the source a preview image of the video data;

specifying parameters relating to the video data and sending the parameters to the source; and

receiving video data transmitted by the source on the basis of the parameters.

2. A video data source for remote access, the source being responsive to a remote user to transmit a preview image of a video data file and being responsive to parameters received from the remote user to transmit video data from the video data file on the basis of the received parameters.

3. A source according to claim 2 wherein the source transmits to the remote user a control program to enable the remote user to specify the parameters.

4. A source according to claim 2 or 3 wherein the control program is a Java applet.

5. A source according to any one of claims 2, 3 or 4 wherein the remote user is a computer terminal.

6. A device for retrieving video data from a remote source, the device including:

means for requesting a preview image of the video data from the remote source;

means for transmitting parameters relating to the video data and requesting video data on the basis of the parameters; and

means for retrieving video data supplied from the source on the basis of the parameters.

7. A method, source or device according to any preceding claim wherein the video data is retrieved over the Internet.

8. A method, source or device according to any preceding claim wherein the source comprises a network server.

9. A method, source or device according to any preceding claim wherein the source comprises an Internet server.

10. A method, source or device according to any preceding claim wherein the parameters specifying one or more of a required image customisation, the temporal extent of the video data required, the spacial extent of the video data required, an extent to which the video data should be zoomed, the playback speed of the video data, the nature of the encoding of the video data, the digital video format, the compression/decompression algorithm, the degree of compression or compression quality and image processing.

11. A method, source or device according to any preceding claim wherein the source processes the video data according to the parameters to provide one or more of a customized image, a temporal extract from the video data, a spacial extract from the video data, zooming of the video data, variations in playback speed of the video data, encoding customisation of the video data, selection of the digital video format, selection of compression/decompression algorithms, selection of the degree of compression or compression quality and selection of image processing.

12. A method, source or device according to any preceding claim wherein the source obtains the video data from a remote database.

13. A method of retrieving video data from a remote source substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

14. A video database source constructed and

arranged substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

15. A device for retrieving video data substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

ABSTRACT

METHOD AND DEVICE FOR RETRIEVING VIDEO DATA FROM A REMOTE SOURCE AND VIDEO DATA SOURCE FOR REMOTE RETRIEVAL

A method of retrieving video data from a remote source, the remote source and a device for retrieving the video data wherein the method comprises retrieving from the source a preview image of the video data, specifying parameters relating to the video data and sending the parameters to the source, and receiving video data transmitted by the source on the basis of the parameters.

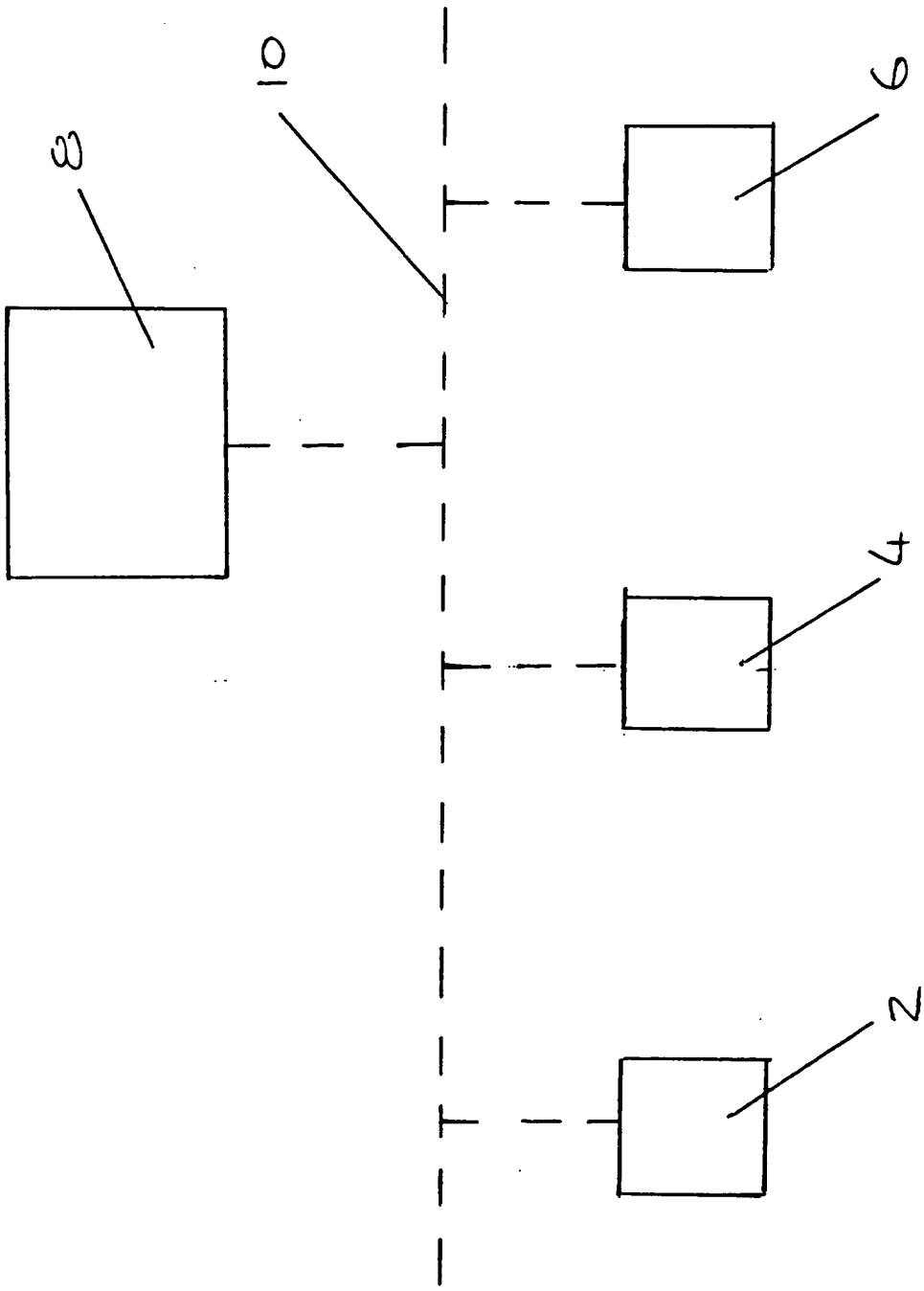


Fig 1

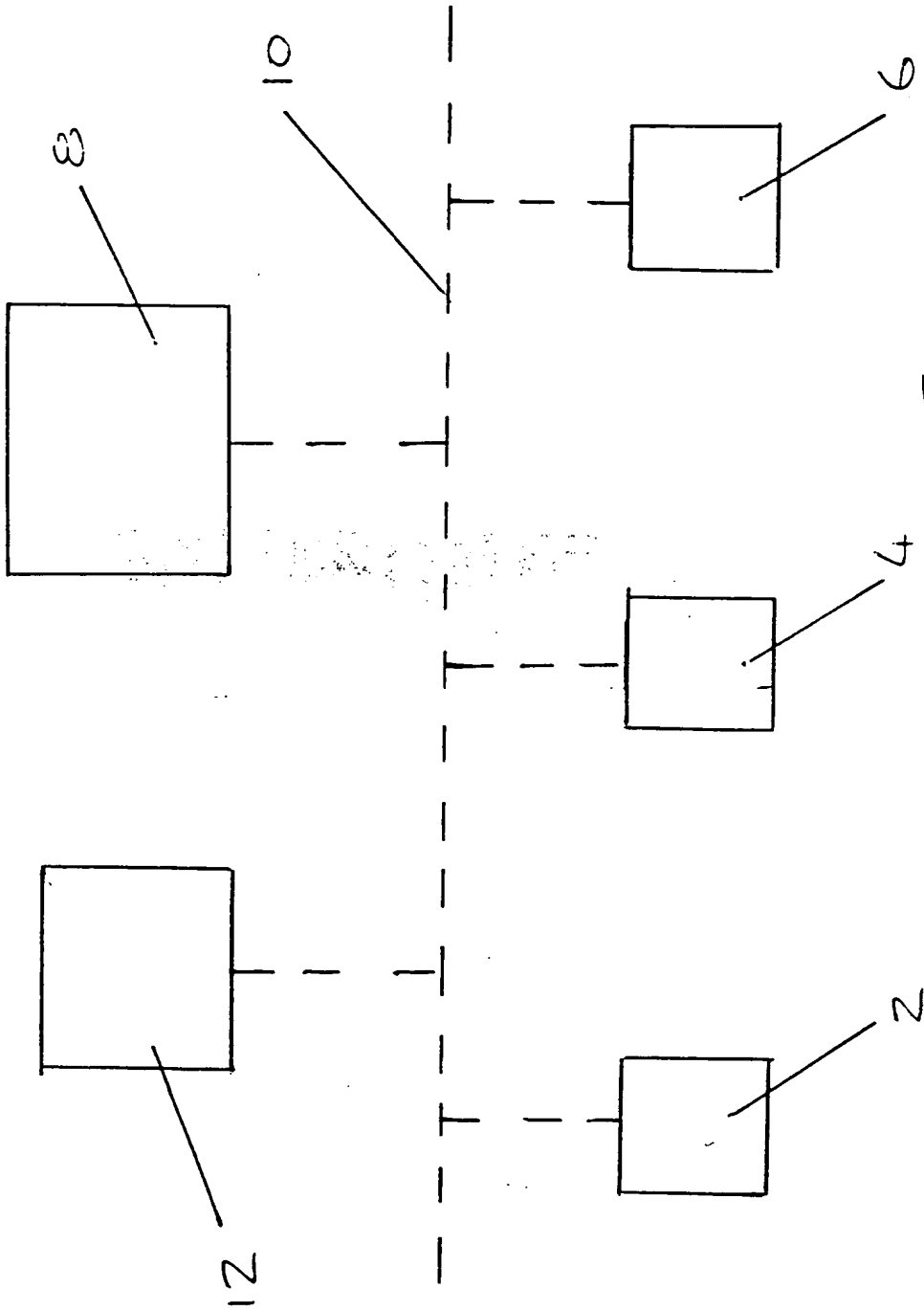
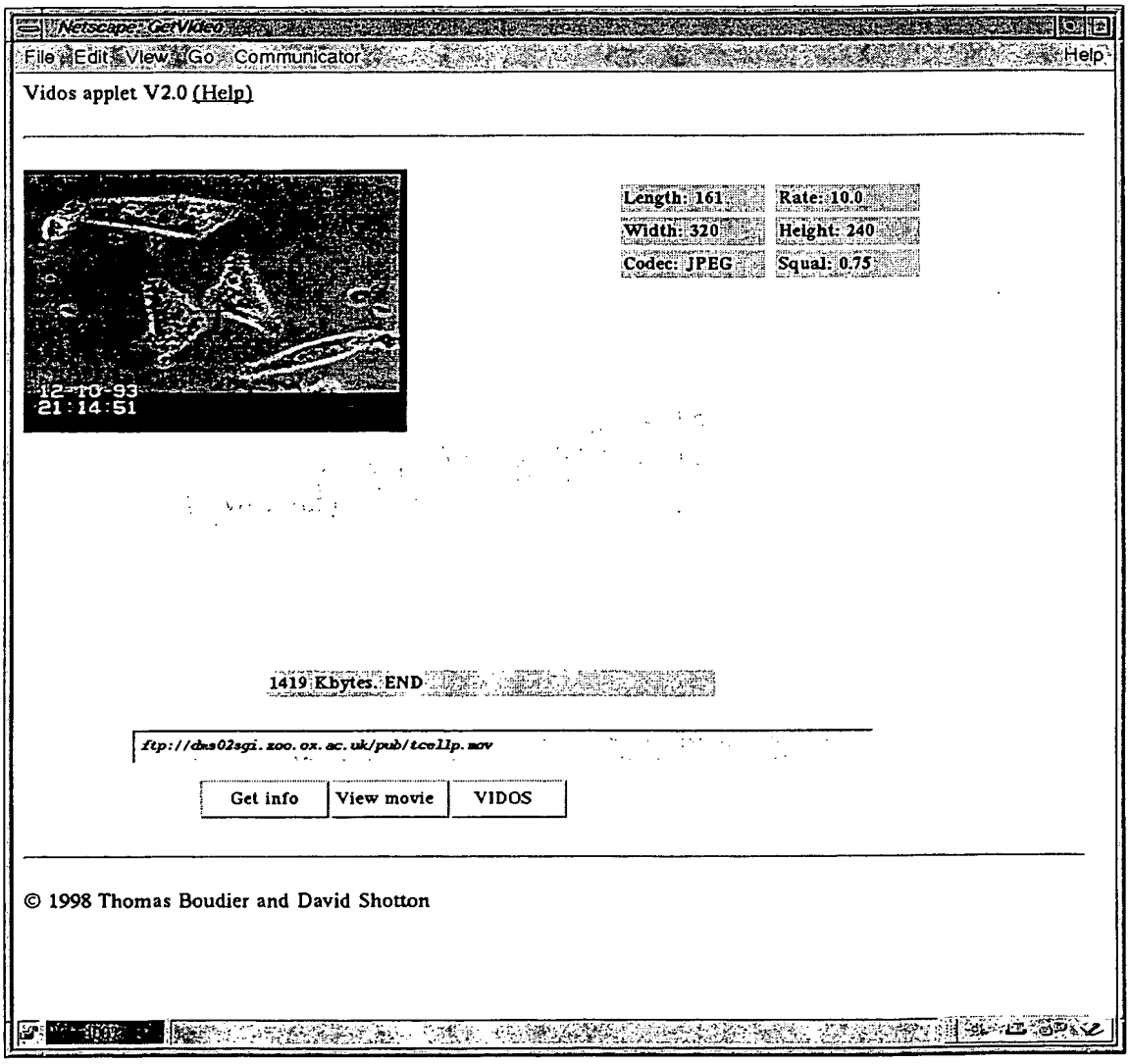


Fig 2

FIG. 3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Rate: 10.0
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Height: 240
Codec: JPEG
Squal: 0.75
1419 Kbytes. END
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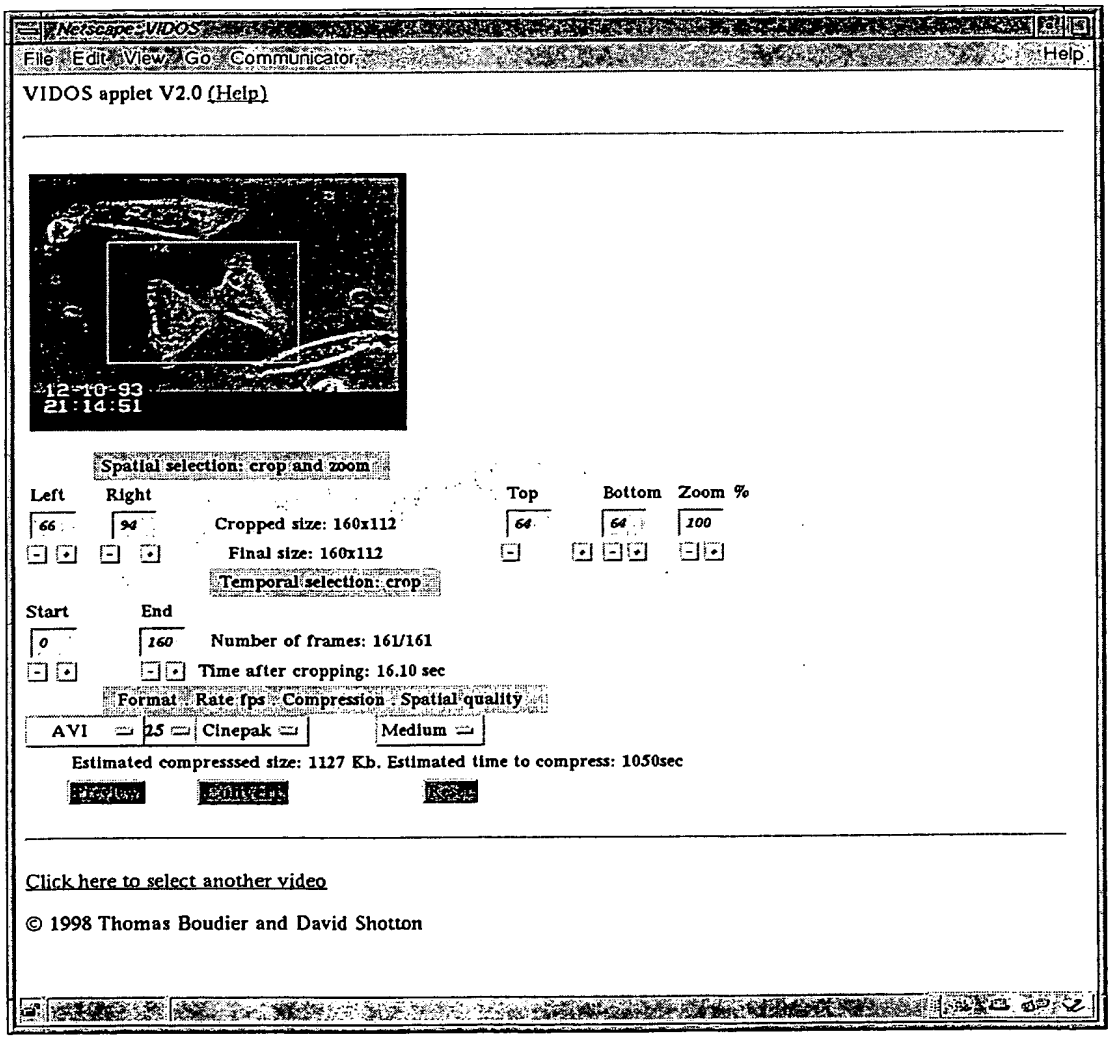
Get info
View movie
VIDOS
© 1998 Thomas Boudier and David Shotton

FIG. 4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Help
VIDOS applet V2.0 (Help)
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21:14:51
Spatial selection: crop and zoom
Left
Right
Top
Bottom
Zoom %
66
94
64
64
100
Cropped size: 160x112
Final size: 160x112
Temporal selection: crop
Start
End
0
160
Number of frames: 161/161
Time after cropping: 16.10 sec
Format
Rate fps
Compression
Spatial quality
AVI
25
Cinepak
Medium
Estimated compresssed size: 1127 Kb. Estimated time to compress: 1050sec
Preview
Convert
Reset
Click here to select another video
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